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ABSTRACT

When education (teaching and/or learning) is considered to be an art, then it seems obvious that the methods of artistic inquiry would be appropriate analysis techniques. Such analysis seems to be rare or non-existent in educational technology. Semiotics, the theory of signs, provides one such set of methodologies for examining text. This presentation uses a variety of semiotic critical methods to explore the products and processes of educational technology as text. Semiotics is often divided into syntactics, semantics and pragmatics, and semiotic criticism can be based on just one or two of these divisions, or it can include all three. Syntactic criticism focuses on the structure of the work. These structures can be assessed simply in terms of the evolution of structural form (and the possibility of revolutionary change in form), or the forms can be evaluated in relation to the use of the work. Semantic criticism stresses meaning manifest in the work. While semantics are normally applied to textual materials, critics have also used semantics as a formal approach to visual literacy concepts. Pragmatics link antecedents (causes), features of the work, and results. Such inquiry can address unintended or unanticipated effects a work might have on its audience. (CGD)

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Applying semiotic theory to educational technology

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Abstract

When education (teaching and/or learning) is considered to be an art, then it seems obvious that the methods of artistic inquiry would be appropriate analysis techniques. Such analysis seems rare or non-existent in educational technology. Semiotics, the theory of signs, provides one such set of methodologies for examining text. This presentation will explore the products and processes of educational technology as text using a variety of semiotic critical methods.

Semiotics is often divided into syntactics, semantics and pragmatics. Semiotic criticism can be based on just one or two of these divisions or it can include all three. Syntactic criticism focuses on the structures of the work. These structures can be assessed simply in terms of the evolution of structural form (and the possibility of revolutionary change in form) or the forms can be evaluated in relation to the use of the work. Semantic criticism stresses meaning manifest in the work. While semantics are normally applied to textual materials, critics have also used semantics as a formal approach to visual literacy concepts. Pragmatics link antecedents (causes), features of the work, and results. Such inquiry can address unintended or unanticipated effects a work might have on its audience.

Introduction

THERE IS AN EXCITING DEBATE which appears to be just peaking within the field of educational technology. Our focus of research questions is broadening out. We are moving from questions of "how?" to questions of "why?" We are moving from a search for a single interpretation of reality and truth, towards multiple and simultaneous interpretations. We are moving from an acceptance of strictly scientific modes of inquiry towards an acceptance of a variety of critical alternatives.

Today's symposium attempts to recognize some of these alternative methodologies. Whether our individual focus is criticism and connoisseurship, or reader-response theory, or post-modernism or semiotics, our joint objective is to provide new ways of looking at old questions, and perhaps at new questions.

The keyword around which this paper will operate is **semiotics**, the study of signs. While the term has been traced back to 1641, referring specifically to "signs and symbols and the study of their use in conveying meaning (Barnhart, 1988, p. 982)," semiotics itself has only recently and rather quietly entered the vocabulary and the consciousness of educational technologists. Yet its import is reflected in the contemporary literature, albeit still almost unnoticed.

Look at only four of the the most recent examples. In the latest issue of Programmed Learning and Educational Technology from the United Kingdom, David Smith (1988) examines interactive media and instructional software from a semiotic viewpoint. "New ways of conceptualizing human interaction are evolving which are not predicted on hard 'engineering models. [One such is] a practical development of semiotic analysis" (p. 342).

In the US, the Educational Communications and Technology Journal (Korac, 1988) has recently featured a paper suggesting a semiotic analysis of audiovisual media. And another ECTJ paper titled "Good Guys and Bad Guys" (Cunningham, 1986) takes on Richard Clark's meta-analytic research. Noting that educational technologist's elusive goal is to "discover once and for all which method/medium is best, which is the good guy, and which is the bad guy.", Cunningham argues for a constructivist and semiotic approach to educational research, so that knowledge is seen as being constructed rather than discovered. Then, "if we come to understand the constructive nature of our knowledge, we can make more modest, context-dependent claims about 'the truth of the matter' and be less embarrassed when we are wrong. In other words, there are no good guys and bad guys, only guys"(p. 7).

A fourth example is a just released book by Marshall & Eric McLuhan (1988). Titled Laws of Media, the study presents four "laws", provides a

structural analysis of selected media, and concludes with a suggestion for a focus on media poetics (that is, the systematic study of media as literature):

> As the information which constitutes the environment is perpetually in flux, so the need is not for fixed concepts, but rather for the ancient skill of reading that book, for navigating through an ever uncharted and unchartable milieu. Else we will have no more control of this technology and environment than we have of the wind and the tides. (p. 239)

The above examples should at the very least serve to point out that interest in semiotics is not an isolated one. It seems safe to suggest that semiotics is entering the vocabulary and the modes of inquiry of educational technologists. Yet what is semiotics? The term seems to be not well known and writers seem to run immediately into problems of definition. "Education is a field in which semiotics has had relatively little impact" (Cunningham, 1987).

What is semiotics?

Semiotics is the study of signs and sign systems of all kinds. It involves the production of signs, communication through signs; the systematic structuring of signs into codes; the social function of signs, and finally, the meaning of signs. The first important insight which semiotics provides is that signs and sign systems are arbitrary and culturally bound. The second important insight from semiotics, which follows the first, is that linguistic concepts can be used to analyze far more than merely linguistic texts, but all texts, where a text is anything to be read, in the broadest sense.

Robert Scholes(1982): "semiotics has in fact become the study of codes: the systems that enable human beings to perceive certain events or entities as signs bearing meaning...As an emerging field or discipline in liberal education, semiotics situates itself on the uneasy border between the humanities and the social sciences...As the study of codes and media, semiotics must take an interest in ideology, in socioeconomic structures, in psychoanalysis, in poetics and in the theory of discourse"(p ix-x). If semiotics is concerned with signs, then it is equally concerned with meaning. Ultimately, semiotics is the study of meaning, meaning systems, and the origination and generation of meaning. These meanings are grounded in text and discourse.

David Sless (1986): "Semiotics is above all an intellectual curiosity about the ways we represent our world to ourselves and each other" (p. 1).

"Semiotics studies messages and in order to study messages we have to read them. A reader is always a participant, never an observer" (p. 30).

Umberto Eco(1976): "Semiotics is concerned with everything that can be taken as a sign. A sign is everything which can be taken as significantly substituting for something else...semiotics is in principle the discipline studying everything which can be used in order to lie" (p. 7).

Where do semiotic studies fit within the educational technology endeavor?

Educational technology, most often described as a "systematic approach" to teaching and learning, is inevitably involved with communication, signs, codes, and meaning. Therefore, it would seem that semiotics should be a compatible and parallel field from which educational technology might benefit. There is a major tradition in education, ultimately overlapping with educational technology, into which a semiological approach seems especially appropriate, namely curriculum theory. It is this tradition which provides a potential coupling of educational technology and semiotics.

Schubert (1988), borrowing from Habermas(1971), identifies curriculum as operating within three alternative paradigms. The dominant curriculum paradigm is the "technical" (Habermas: empirical-analytic). A second paradigm for curriculum inquiry is the "situational interpretive" (Habermas: Historical-hermeneutic). The third paradigm is identified as "critical theoretic" (Habermas: critical theory). Aoki (1986) describes the focus of interest in each: In the technical or means-ends model, "interest is in the ethos of control as reflected in the values of efficiency, effectiveness, certainty and predictability. In the situational-interpretive or practical paradigm, interest focuses on "the meaning structure of intersubjective communication between and among people who dwell within a situation." In the critical-theoretic mode, interest is "emancipation from hidden assumptions or underlying human conditions."

This technical/practical/critical trichotomy is useful in locating what is taking place in educational praxis. Educational technology with a penchant for better task analysis techniques and more precise behavioral objectives, not to mention a concentration on the next new medium just around the corner, falls squarely within the technical orientation.

Within curriculum theory there is also a readily identified "practical" dimension of curriculum exemplified in the writings of Joseph Schwab (1973). Schwab's well known commonplaces are the teacher, the learner, the milieu, and the subject matter. "Defensible educational thought must take account of the four commonplaces of equal rank...None of these can be omitted without omitting a vital factor in educational thought and practice."

When one examines the AECT "official" definition of educational technology side by side with these four commonplaces, the similarity becomes apparent:

> Educational technology is a complex, integrated process involving people, procedures, ideas, devices, and organization for analyzing problems, and devising, implementing, evaluating, and managing solutions to those problems (AECT, 1977).

The juxtaposition of the two definitions is additionally significant, since it illustrates that educational technology is not locked into the technological paradigm, but indeed has apparently endorsed this second significant alternative paradigm. Such a positioning of educational technology shows that the discourse of the field is not as one-sided and single-minded as some would have us believe.

Semiotic, connoisseurship, and post-modern approaches fall within the third paradigm, the critical. Within this third paradigm "the object of the critic ... is to seek not the unity of the work, but the multiplicity and diversity of its possible meanings, its incompleteness, the omissions which it displays but cannot describe, and above all, its contradictions" (Belsey, 1980, p. 109). It has **not** normally been the concern of educational technology to focus on this domain. The role of the technologist is to implement someone else's objectives. As recent a text as Knirk and Gustafson (1986) is clear on this point: "Although an instructional technologist may have a voice in creating policy, he or she is primarily responsible for *implementing* policy decisions...If an instructional technologist questions the goals, an interpretation should be provided by a representative of the policy making body " (p. 33, emphasis mine). Such a statement clearly places educational technology as overlapping the technical and practical dimensions as identified above, but outside the critical dimension.

Yet today's symposium argues precisely in favour of adding this third paradigm to the discourse of educational technology.

Semiotic questions in educational technology

This section will identify some key semiotic concepts which appear to hold particular promise for educational technology. Time and space permit not much more than a mere listing of areas ripe for exploration.

1. **The concept of sign**. The nature of the interaction between signifier and signified (from Saussure), and the importance of semiosis and the interpretant (from Peirce) provide starting points for an examination of meaning of and within educational products.

2. Structure of educational media as constructed "text". A variety of methodologies exist which have been used to explicate underlying structure in literature, poetry and film. Such techniques need to be applied to educational media and technology.

3. The role of the reader. Reader response theory extends semiotics by focusing on the newly re-discovered importance of the reader in the triadic relationship between the author, the text, and the reader.

4. The Rhizome. The rhizomatic (rhizome = tuber, plant root which is at once root, stem, bulb, connects all parts of the plant to all other parts) metaphor of Umberto Eco (1984) provides a useful extension and/or alternative to the cognitive view of learning.

5. Syntagmatic and paradigmatic analyses. Paradigmatic and syntagmatic analyses require the reader to examine the structure of texts in terms of its horizontal and vertical dimensions. Sophisticated insights into the nature of media, technology, and mass culture have resulted from such analyses in a variety of fields from literary criticism to sociology.

At this point it is appropriate to turn to an example which is illustrative how semiotics can inform the role of the instructional developer.

The case of the limp french fries.

A few years ago, I attended a convention on instructional development. I remember a session in which the speaker was talking about how she had identified a training problem and developed an appropriate solution. The problem area was restaurant management. A problem had developed in some of the restaurants which were producing "limp" french fries. This was diagnosed as a training problem. There were, as you can imagine, a variety of potential solutions. Perhaps the potatoes were not kept long enough in the fat. Perhaps they were too thick, so could not crisp properly. Perhaps they were allowed to "drip dry" too long; or perhaps it was not long enough. The ultimate cause is not important here. What is important is that a systematic, positivistic model allows one to identify the problem, examine alternative potential causes, and develop an appropriate solution. If it turns out that the solution is not the right one, we recycle. Eventually, through trial and error, through test and retest, through constant monitoring, the problem will be solved.

So where's the debate? I like limp french fries. In fact, where I come from, Winnipeg, Manitoba, where the winter wind chill temperature can exceed 40 below, the hot, thick, greasy, and yes, "limp" french fry, is the *only* french fry. A limp french fry means real potatoes were used, not the re-constituted kind. A limp french fry means freshly cut potatoes; not the kind

you buy pre-cut, pre-packaged; pre-formed. A limp french fry implies only potato; no unnecessary and unhealthy additives to guarantee a false and unnatural crust. In short, the only french fry is a limp french fry.

There is more. If by chance, the french fries come out crisp (heaven forbid), we have a variety of ways to make them limp again. Americans add ketchup. Canadians add white vinegar. And in Winnipeg, an especially popular solution is to serve french fries with gravy. Then they have to be limp!

* * * * * * * * *

What I have just presented you with is a rather simplistic example of **deconstruction** usually credited to Jacques Derrida (1976). Deconstruction is intended to be an astute and careful reading of a text such that the apparent meaning breaks down, and reverses itself when subjected to close scrutiny. Deconstruction is at the heart of the post-modern enterprise. It is carrying the semiotic project to its limit.

Look what our analysis has done. By identifying a problem, we note a series of binary oppositions: limp/crisp; bad/good; unacceptable/acceptable. Second, we see that the concept "crisp" is unintentionally "valorized" as being the ultimate quality. Once we recognize that, we can reverse the valorization. The result is a displacement, and a re-ordering of values. The original meaning crumbles. (Interestingly, in this process, the new reading itself is equally susceptible to a deconstructionist reading,)

What are the implications for curriculum? What are the implications for educational technology? The basic questions of what to teach and why and how are increasingly subject to deconstructionist readings. Why? Because the " post-modern turn" no longer allows a complacent, linear view of how things work. The post-modern view is an all-at-once view, a discontinuous, intermittent view, a view commensurate with a multi-cultural society. The traditional subject is de-centered. And most important, we are allowed to question the very ground on which we stand. We are not only allowed, but encouraged to ask "Why?"

But I am getting ahead of myself. I have moved into the areas of post-semiotics, or post-structuralism, or post-modernism.

Let us return to the case of the limp french fries. Our purpose will be to unpack the text and to uncover the structural ambiguity which is inherent in the process of reading, interpretation and understanding. For educational technologists, such a task is paramount. Following the schema of Sless(1986), we begin by recalling the author - text - reader paradigm. In fact, there are two types of texts. The author/text is the text generated by and understood by the author. The reader/text is the text generated by the reader in his search to make sense of the author/text.

We can horizontally represent my role as reader of the story of the limp french fries as R1. This reader is directly linked to the instructional

developer who authored the ID report. Let us call this individual A2. Schematically we have:

R1.....A2

However A2, before becoming and author, was a reader, which can be designated R2. It was this reader who noted and identified the problem of the "limp french fries, identifoed as P. Now we have

R1.....A2/R2.....P

Returning to the beginning of the scheme, we see a missing step. I am no longer a reader R1 of this story; but in telling it to you, I am an author. The current reader is you, R0:

R0.....A1	R1.....A2	R2.....P
This Presentation	Instructional Developer	Product

What we have produced is the first stage of a schematic representation of the story of the limp french fries as it moves from a variety of perspectives and interpretations. To summarize:
R0 is you as reader of this presentation, here and now,
A1 represents me as author of this presentation,
R1 represents me as reader of the "limp french fries" story,
A2 represents the instructional developer as author,
R2 represents the instructional developer as reader of the situation, and
P represents the situation, as read by the instructional developer.

Of course, one might increase the level of complexity, as well as the length of the horizontal displacment, but that is unnecessary at this stage. The purpose of such an exercise is to highlight the constructed nature of reality leading to a clearer understanding of the social interactions involved. In addition, the technique attempts to identify the layers through which the reader/author dichotomy has moved.

One additional comment will serve to round off this analysis. First, the model brings out an intriguing comparison with our penchant to model the human mind on the computer. There is, interestingly, a computer version of this activity which I have just described. Whenever one wishes to copy a file onto a backup disc, one goes through a process in which the computer reads the file, then copies or writes that file onto the new disc. While this is

happening, the computer screen presents a message which typically says "reading" during the first phase, then "writing" during the copying phase. These terms, reading/writing alternative until the entire file is copied.

The situation is analogous to the reader/author interaction described above. However the difference is significant. In the computer model, the computer "reads" everything, literally, then "writes" everything. What makes humans special is that we read selectively as we are simultaneously influenced by a host of environmental and social factors; then we write, also selectively. Semiotics brings out clearly the very human characteristics and the constructed characteristics of message and meaning analysis.

Conclusion

In this paper, I have tried to highlight some dimensions of applying semiotic techniques to educational technology. Semiotics produces techniques for reading texts. As educational technology becomes more sophisticated, we need to familiarize ourselves with the complex relation of text to author to reader. As educational technologists we are all three.

Yet our road to improve communications is a thorny one. Douglas Adams said it with sarcasm in The Hitchhiker's Guide to the Galaxy , but his warning is not to be taken lightly.

> ...if you stick a Babel fish in your ear you can instantly understand anything said to you in any form of language...[T]he poor Babel fish, by effectively removing all barriers to communication between different races and cultures, has caused more and bloodier wars than anything else in the history of creation. (p. 50)

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